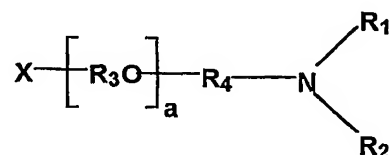


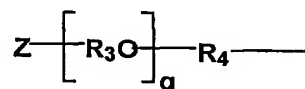
What is claimed is:

- 5 1) A process for the formation of a polyurea polymer which comprises the steps of:
- A) providing a first composition which comprises one or more organic isocyanates;
- B) providing a second composition which comprises one or more polyether polyamino compounds within the definitions of formula:



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in which R_1 and R_2 are each independently selected from the group consisting of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 carbon atoms, whether straight-chain or branched; or a radical of the formula:



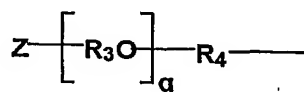
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in which R_3 in each occurrence may be an alkyl group having any number of carbon atoms selected from 1, 2, 3, 4, 5, or 6, straight-chain or branched; R_4 in each occurrence is a straight-chain or branched alkyl bridging group having 1, 2, 3, 4, 5, or 6 carbon atoms; Z is a hydroxy group or alkyl group containing 1, 2, 3, 4, 5, or 6 carbon atoms, straight-chain or branched; q is any integer between 0 and 400; and wherein X is any of:

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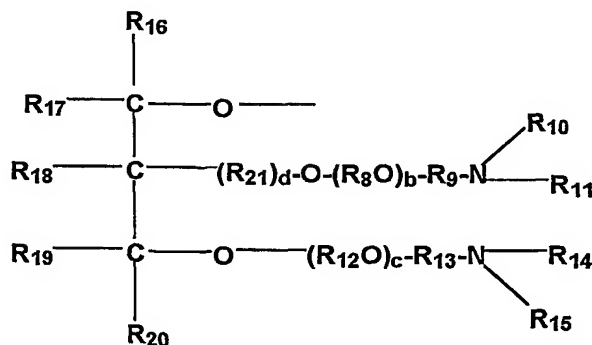
i) a hydroxy group or an alkyl group having any number of carbon atoms selected from 1, 2, 3, 4, 5, or 6; or

5 ii) a group $\begin{matrix} R_5 & R_5 \\ / & / \end{matrix}$ or R_6-N- or R_6-N-R_7- in which R_5 and R_6 are each independently selected from the group consisting of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 carbon atoms, whether straight-chain or branched; or

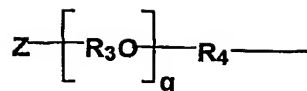


10 as defined above in which Z is a hydroxy group or an alkoxy group having 1, 2, 3, 4, 5, or 6 carbon atoms, and in which R_7 is a straight-chain or branched alkylene bridging group having 1, 2, 3, 4, 5, or 6 carbon atoms; or

15 iii) a moiety of the formula:



in which R_{10} , R_{11} , R_{14} , and R_{15} are each independently selected from the group of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 carbon atoms, straight-chain or branched; the moiety



as defined above in which Z is a hydroxy or alkoxy group having 1, 2, 3, 4, 5, or 6 carbon atoms; R₈ and R₁₂ are each independently alkyl groups having 1, 2, 3, 4, 5, or 6 carbon atoms, straight-chain or branched; R₉, R₁₃, and R₂₁ are each independently selected from a straight-chain or branched alkyl bridging linkage having 1, 2, 3, 4, 5, or 6 carbon atoms; R₁₆, R₁₇, R₁₈, R₁₉, R₂₀ are each independently selected from hydrogen or an alkyl group having 1, 2, 3, 4, 5, or 6 carbon atoms; d is 0 or 1; a is any integer between 0 and 100, with the proviso that when X is a moiety of the formula given in iii) above, b and c may each independently be any integer in the range of 0 to 390, and the sum of a+b+c is any number between 2 and 400; and

C) mixing said first component with said second component, so as to form a mixture which cures to form a polyurea polymer,

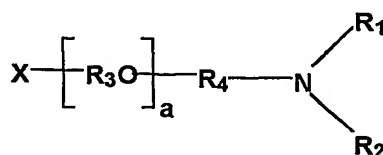
wherein said one or more polyamino compounds comprise secondary polyether polyamino compounds.

2) A process according to claim 1 wherein the number of active hydrogen atoms present in said second composition is greater than the number of isocyanate groups present in said first composition.

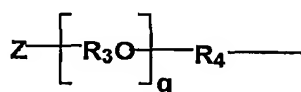
- 3) A process according to claim 1 wherein the mixing of said first component with said second component is performed in the substantial absence of a chain extender.
- 4) A process according to claim 1 wherein said second composition comprises a secondary
5 polyether polyamine triamine.
- 5) A process according to claim 1 wherein said second composition comprises a secondary polyether polyamine diamine.
- 10 6) A process according to claim 1 wherein said second composition comprises at least one material selected from the group consisting of: diamine chain extenders; primary polyether polyamines; and pigments.
- 7) A process according to claim 1 wherein said organic isocyanate is an aliphatic isocyanate.
15
- 8) A process according to claim 7 wherein said organic isocyanate is selected from the group consisting of: IPDI; dicyclohexylmethane di-isocyanate; HDI dimer; HDI trimer; and cyclohexyl di-isocyanate.
- 20 9) A process according to claim 1 wherein said organic isocyanate is an aromatic isocyanate.

10) A process according to claim 9 wherein said organic isocyanate is selected from the group consisting of: tetramethylxylene di-isocyanate; diphenylmethane di-isocyanate; toluene di-isocyanate, and all isomers of the foregoing.

- 5 11) A polyurea polymer which comprises the reaction product of an organic isocyanate with one or more secondary polyether polyamino compound(s) within the definitions of formula:



10 in which R_1 and R_2 are each independently selected from the group consisting of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 7, 8, 9, or 10 carbon atoms, whether straight-chain or branched; or a radical of the formula:

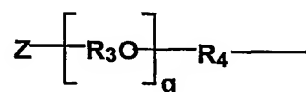


15 in which R_3 in each occurrence may be an alkyl group having any number of carbon atoms selected from 1, 2, 3, 4, 5, or 6, straight-chain or branched; R_4 in each occurrence is a straight-chain or branched alkyl bridging group having 1, 2, 3, 4, 5, or 6 carbon atoms; Z is a hydroxy group or alkyl group containing 1, 2, 3, 4, 5, or 6 carbon atoms, straight-chain or branched; q is any integer between 0 and 400; and wherein X is any of:

- i) a hydroxy group or an alkyl group having any number of carbon

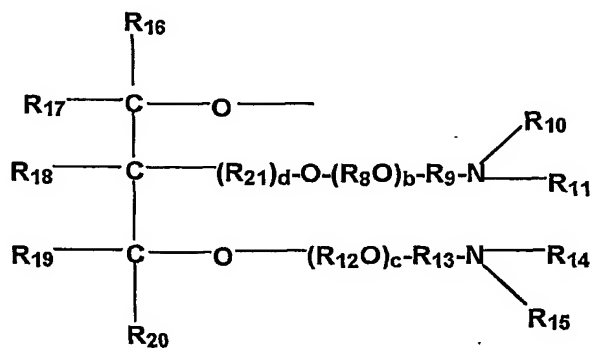
atoms selected from 1, 2, 3, 4, 5, or 6; or

- 5 ii) a group $\begin{array}{c} R_5 \quad R_5 \\ / \quad / \\ R_6-N- \text{ or } R_6-N-R_7- \end{array}$ in which R_5 and R_6 are each independently selected from the group consisting of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 7, 8, 9, or 10 carbon atoms, whether straight-chain or branched; or

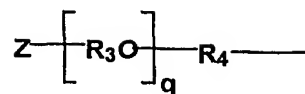


- 10 as defined above in which Z is a hydroxy group or an alkoxy group having 1, 2, 3, 4, 5, or 6 carbon atoms, and in which R_7 is a straight-chain or branched alkylene bridging group having 1, 2, 3, 4, 5, or 6 carbon atoms; or

- 15 iii) a moiety of the formula:



- in which R_{10} , R_{11} , R_{14} , and R_{15} are each independently selected from the group of: hydrogen; an alkyl group having 1, 2, 3, 4, 5, 7, 8, 9, or 10 carbon atoms, straight-chain or branched; the moiety
- 20



as defined above in which Z is a hydroxy or alkoxy group having 1, 2, 3, 4, 5, or 6 carbon atoms; R₈ and R₁₂ are each independently alkyl groups having 1, 2, 3, 4, 5, or 6 carbon atoms, straight-chain or branched; R₉, R₁₃, and R₂₁ are each independently selected from a straight-chain or branched alkyl bridging linkage having 1, 2, 3, 4, 5, or 6 carbon atoms; R₁₆, R₁₇, R₁₈, R₁₉, R₂₀ are each independently selected from hydrogen or an alkyl group having 1, 2, 3, 4, 5, or 6 carbon atoms; d is 0 or 1; a is any integer between 0 and 100, with the proviso that when X is a moiety of the formula given in iii) above, b and c may each independently be any integer in the range of 0 to 390, and the sum of a+b+c is any number between 2 and 400;

wherein said polyurea polymer has a tear strength of at least 550 pli as measured using ASTM test method D-624.

12) A polymer according to claim 11 wherein said secondary polyether polyamino compound(s) comprises a secondary polyether polyamine triamine.

13) A polymer according to claim 11 wherein said secondary polyether polyamino compound(s) comprises a secondary polyether polyamine diamine.

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14) A polymer according to claim 11 wherein said polymer includes at least one material selected from the group consisting of: diamine chain extenders; primary polyether polyamines; and pigments in its polymer backbone.

15) A polymer according to claim 11 which includes an aliphatic repeating unit that is derived from an aliphatic isocyanate.

16) A polymer according to claim 15 wherein said organic isocyanate is selected from the group consisting of: IPDI; dicyclohexylmethane di-isocyanate; HDI dimer; HDI trimer; and cyclohexyl di-isocyanate.

17) A polymer according to claim 11 wherein said organic isocyanate is an aromatic isocyanate.

18) A polymer according to claim 17 wherein said organic isocyanate is selected from the group consisting of: tetramethylxylene di-isocyanate; diphenylmethane di-isocyanate; toluene di-isocyanate, and all isomers of the foregoing.

19) A polyurea polymer according to claim 11 wherein said polyurea polymer is a prepolymer having a molecular weight between about 500 and about 20,000 (weight average molecular weight) and an isocyanate content of between about 1 % and 38 % by weight based on the total weight of said prepolymer.

20) A prepolymer according to claim 11 having a viscosity of between about 80 and 10,000 centipoise at 25 degrees C.